

<u>Public Health</u>

Agency for Toxic Substances & Disease Registry Assessments &

Health Consultations

PUBLIC HEALTH ASSESSMENT

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Prepared by

U.S. Department of Health and Human Services Public Health Service Agency for Toxic Substances and Disease Registry Division of Health Assessment and Consultation Atlanta, Georgia

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PUBLIC HEALTH ASSESSMENT

McCORMICK & BAXTER CREOSOTING COMPANY (PORTLAND) PORTLAND, MULTNOMAH COUNTY, OREGON

SUMMARY

The McCormick and Baxter Creosoting site is located on the Willamette River in Portland, Oregon. The company terminated operations in 1991, and clean-up activities have been initiated.

ATSDR considers the site to have been a <u>public health hazard</u> for former plant workers because of past ingestion <u>exposure</u> to arsenic, creosote, pentachlorophenol, polychlorinateddibenzodioxins, and dibenzofurans at levels of public health concern. Past estimated exposure <u>doses</u> indicate a low to moderate increased cancer risk. Additional exposure via <u>inhalation</u> orskin contact could increase the health risk. The site also poses an ongoing and future publichealth hazard because people might encounter hazardous chemicals along the shoreline on ornear the site at levels that can damage the skin, as was reported to have happened to two boys. Finally, dioxin levels would pose a public health hazard if people subsist on crayfish and suckerscontaminated with polychlorinated dibenzodioxins and dibenzofurans.

The site poses an indeterminate public health hazard for nearby residents because of past, present, and future inhalation exposure. Insufficient information regarding air contaminant levels makes accurate evaluation of inhalation exposure impossible. Some of the informationneeded for evaluation of exposure, especially past exposures, might never be acquired. Community members reported odors and lung effects, including bronchitis, breathing difficulties, lung tissue damage, lung spots, and lung cancer. These self-reported symptoms have not been confirmed by ATSDR. The source or sources of air contaminants causing odors that continue tobe reported by community members has not been determined. The adverse lung symptoms are non-specific symptoms known to be experienced by people with no known exposure tohazardous waste, but they are also consistent with exposure to site-related contaminants.

In addition to odors and lung effects, community members have expressed concerns aboutcancer, the safety of produce from Sauvies Island, and skin burns from wading in the river.

Additional soil sampling on adjacent industrial properties and <u>ambient</u> air monitoring inodor-affected residential areas have been recommended. Air monitoring on site during certainremedial activities also has been recommended. In addition, the site should not be developed orotherwise accessed by the public until remediation measures are accomplished in a manner that effectively prevents human exposures from occurring at levels of public health concern. Community and health professions education has been recommended.

BACKGROUND

The Agency for Toxic Substances and Disease Registry (ATSDR), located in Atlanta, Georgia, isa federal agency within the U.S. Department of Health and Human Services. ATSDR, under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), conducts <u>public health assessments</u> for sites the U.S. Environmental Protection Agency (EPA) proposes for its National Priorities List (NPL). In June 1993, The EPA announced its proposal toinclude the McCormick & Baxter Creosoting Company (MB) site on the NPL. Therefore, ATSDR has, under its mandate, evaluated the public health significance of this site by considering whether health effects are possible and has recommended actions to mitigate possible future exposure.

A. Site Description and History

Background

MB treated wood at a site on the Willamette River in Portland, Oregon, downstream of SwanIsland and upstream of the St. Johns Bridge (<u>Figures 1</u> and <u>2</u>). The property extends from theriver to the base of a 120-foot high bluff in an area built with dredged materials in the early1900s. MB was founded in 1944 and continued operation until October 1991, after which theowners vacated the premises. Wood treating materials used include creosote/oil mixtures, pentachlorophenol/oil mixtures, and several water-based solutions containing arsenic, chromium,copper, and zinc (<u>1</u>).

The principal facilities included retorts, a tank farm, a creosote tank, hazardous waste storage, aformer waste disposal pond and trench, a dock, and office and laboratory buildings (1).

Waste-related activities reported include the following $(\underline{1})$:

- Between 1945 and 1969, wastewater and cooling water were discharged into the river.
- The sump at one retort possibly once discharged to the river.
- Boiler water, storm water, and oily wastes were reportedly directed to a waste disposal trenchin the southeast part of the site prior to 1971. Contaminated soil was removed from this areain the 1980s.
- Two major chemical or creosote spills reportedly have occurred.
- Waste oil containing creosote and pentachlorophenol were applied to soils to improve theirstructural stability.
- Treated wood products were placed in the river at various times prior to shipment. An areacontaining oily sediments was reportedly dredged approximately every 3 years during the Vietnam War; the disposal location of those sediments is unknown.
- Residues from retorts, an oil/water separator, and evaporators were disposed of in the formerwaste disposal area.
- Contaminated soils were removed on more than one occasion while the facility was in operation.

Releases of contaminants into the environment were first reported to the Oregon Department of Environmental Quality (ODEQ) in 1983. MB conducted preliminary investigations and hadpartially completed intitial remedial measures when they vacated the property in October 1991. ODEQ initiated a remedial investigation that began in 1990 and was completed in September 1992. Studies have shown that surface and subsurface soils, groundwater, and river sediments have been contaminated. Some chemicals have moved far

below the surface and toward the Willamette River. In some areas, pools of creosote have accumulated at or below the water table (1).

Recent Remediation and Remediation Plans

ODEQ began in December 1991 to prevent releases of chemicals remaining at the site, tomaintain site security, and to reduce storm water discharges. In December 1992, ODEQ began toimplement interim clean-up measures that include pumping creosote and other oily wastes from extraction wells and installing cutoff trenches designed to capture pollutants seeping towards theriver. The site perimeter fences have been extended into the tidal zone of the river to limit access off-site sediment seeps exposed at low tide. Fences now surround essentially all the property except for a segment along the river. A system of buoys has been placed along the waterfront. Warning signs have been placed on the site perimeter (1,2).

A broader clean-up plan being proposed is summarized as follows (3):

- Remove pooled chemicals from the ground to the extent possible.
- Consider pumping groundwater as a future option.
- Monitor groundwater quality.
- · Remove site structures.
- Selectively excavate highly contaminated surface soils; selectively stabilize contaminated soilareas; and place a 3- to 5-foot cover of clean fill material over all site soils.
- Take no action for off-site soils.
- Remove any potentially mobile chemicals present in sediments.
- Cover contaminated sediments in place.
- Consider developing technologies such as *in situ* biological treatment as possible methods forreducing subsurface contaminant <u>concentrations</u>.
- Monitor the effectiveness of the remedial measures and, if warranted, initiate additionalmeasures.

B. Site Visit

Three ATSDR representatives--Stephanie Prausnitz, Don Gibeaut, and Greg Thomas--andrepresentatives of ODEQ, EPA, and the Oregon Department of Human Resources, HealthDivision, visited the site on February 23, 1994. <u>Public availability sessions</u> also were held onthat day. Pertinent information obtained during that visit is described in appropriate sections of this document.

C. Demographics, Land Use, and Natural Resource Use

Land Use

Flat, low-lying segments of land on both sides of the Willamette River in the City of Portlandhave been developed extensively for light to heavy industry. The industrial propertyimmediately northwest of the site, now vacant, once was used for shipbuilding andmanufacturing wooden casks or tubs (1). ATSDR representatives observed industrial propertyimmediately to the southeast being used to manufacture Portland cement products and to storeprivately owned chemical emergency and remedial response vehicles and associated equipment. That property is known to have been used previously as a barge maintenance and dredgingfacility (1). ATSDR reviewed old photographs that show substantial, but unidentifiable, activitythere. A chemical company and petroleum refinery are on the waterfront across the river from the site (1).

ATSDR representatives also observed that the northeast side of the site is bordered by a 120-foothigh bluff, which generally parallels the river. The area on and beyond the bluff is principally residential. The University of Portland, also on the bluff, is about 2,000 feet southeast of the site.

Demographics

The 1990 census (4,5) provides information about population density and population characteristics in the site area:

Density

Within ½ mile--approximately 1,100 Within 1 mile--approximately 7,900 Within 2 miles--approximately 28,000

Characteristics--Within ½ Mile
White--92.2%
Black--1.9%
American Indian, Eskimo, and Aleut--1.4%
Asian and Pacific Islander--3.9%
Hispanic--3.4%
Under 18 years old--16.6%

ODEQ advised ATSDR that about 45 persons were employed on site during the final years of operation.

Natural Resource Use

Groundwater and Surface Water

The city water department advised ATSDR that every residence, business, and industry in thearea is connected to the public water system. The source of public water is primarily surfacewater obtained farther inland from water bodies that could not be affected by the site. Thatsource is supplemented, when needed, by wells located more than 10 miles from the property.

Site studies indicate that there is substantive evidence that groundwater flow direction in the sitearea is toward the Willamette River (1). Hence, any wells on the bluff to the northeast, would beupgradient from the site and should not be affected by site releases. ATSDR representatives alsoreviewed records from the U.S. Geological Survey and the Oregon Water Resources Departmentfor evidence of wells in the site vicinity (6). Those records showed that a few wells wereinstalled years ago at locations as near as approximately one-half mile from the property, but the locations are hydraulically upgradient from the site.

ATSDR representatives observed that the Willamette river is used extensively for shipping. Theriver flows generally northward past the site and discharges into the Columbia River severalmiles from the property. ODEQ advised ATSDR that the Willamette River is not used as apublic water supply source between the site and the Columbia River. Several towns, communities, and businesses downstream on the Columbia River either withdraw public waterdirectly from the river or use groundwater withdrawn at locations beside or beneath the river that might be affected by river water quality.

River Biota

Studies show that salmon, steelhead trout, and other game fish and crayfish are abundant in theriver near the site (1).

D. Health Outcome Data

The State of Oregon maintains vital statistics (i.e., information about births and deaths). That information is collected at the county level. Oregon has neither a cancer nor a birth defects registry. No health studies on the workers at or the residents around the site were found.

COMMUNITY HEALTH CONCERNS

Several community members attended the ATSDR-sponsored public availability meeting, whichwas held in Portland on February 23, 1994. At that meeting, community members raisedconcerns about chemical odors in the air, both currently and in the past. One individualcharacterized the past odors as creosote-like. Another individual described waking up at nightunable to breathe because of the "dark brown" smell coming from the site. Concern wasexpressed regarding cancer. A nonsmoker questioned whether contamination from the sitecaused the spots found on his lungs during an X-ray examination. One person who has lived inthe area her entire life questioned whether there was a relationship between site-related exposureand her chronic bronchitis and lung tissue damage. Concern was also expressed about the safetyof produce--including berries, peaches, cucumbers, and cabbage-harvested from a farm onSauvies Island, located approximately one and one-half miles downstream from the site. Finally,community members told of two boys wading at the shore at the site's edge; they waded intocontaminated sediments and sustained chemical burns to their legs. Health officials also reported this event to ATSDR during the site visit.

The concerns reported here are addressed in the Community Health Concerns Evaluation section of this public health assessment.

The McCormick and Baxter public health assessment was available for public review and comment in the local library and local neighborhood association office for a 60-day periodending April 10, 1995. The <u>public comment</u> period was announced in local newspapers. Inaddition, the public health assessment was sent to one individual. Several sets of commentswere received. Specific comments and responses are summarized in <u>Appendix</u> C.

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PUBLIC HEALTH ASSESSMENT

McCORMICK & BAXTER CREOSOTING COMPANY (PORTLAND) PORTLAND, MULTNOMAH COUNTY, OREGON

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

Sampling has been conducted on site for surface soils; subsurface soils; groundwater; NAPLs (nonaqueous-phase liquids [e.g. nonsoluble liquids]); and storm water. Off site sampling wasconducted for surface soils, sediment, crayfish, and fish (Large Scale Sucker).

Those sampling data and supporting site-related information suggest that contaminants associated with wood treatment have been released to on-site soils, groundwater, and storm waterrunoff. Data also suggest that contaminants have migrated off site to sediments and river biota. River water quality also is likely to have been affected to some extent by site releases, butsampling information is not available for confirmation. Citizens' concerns about odor also suggest releases, but sampling information is not available for confirmation. This sectionidentifies contaminants ATSDR representatives have selected for evaluation in later sections of this public health assessment to determine whether exposure to them has public health significance. However, ATSDR's identification of contaminants here does not imply that humanexposure has occurred or that exposure would actually result in adverse health effects.

Contaminant selection considered the following factors:

- Concentrations of contaminants in media.
- Sample locations, field data quality, and laboratory data quality.
- Relationship of concentrations to ATSDR's public health assessment comparison values; the absence of valid comparison values.
- Community health concerns.

ATSDR's (EPA's) 1991 Toxic Chemical Release Inventory (TRI) (7), a database that contains information about annual releases of toxic chemicals to the environment, shows (1) approximately 80,000 pounds (total) of airborne releases of volatile organic compounds and gases were reported by three industrial facilities located between one-fourth of a mile and 1 mile from the site and (2) another 113,000 pounds (total) reported by two facilities located between 1 and 1½ miles from the property. All the facilities are on the west side of the river. Concentration information is not available for TRI data; hence, those airborne contaminants are not addressed further in this section of the assessment.

The specific contaminants selected to be addressed further in the public health assessment are listed in data tables organized according to the media in which they were found (Tables 1through 8 in Appendix B). Those tables include, where available, the public health assessment comparison values ATSDR used for selection. Environmental Media Evaluation Guides (EMEGs) are estimated comparison concentrations that are based on health effects information determined by ATSDR for its Toxicological Profiles for specific chemicals. Cancer RiskEvaluation Guides (CREGs) are estimated comparison concentrations for specific chemicals based on an excess cancer rate of one in a million persons and are calculated using EPA's cancerslope factors. Reference Dose Media Evaluation Guide (RMEG) comparison concentrations are based on EPA's estimate of the daily dose below which exposure to a contaminant is unlikely tocause adverse non-cancer health effects. Proposed Maximum Contaminant Levels (PMCLs) represent EPA's proposed drinking water contaminant concentrations considered protective of public health. Action Levels (ALs) are concentrations in drinking water, which, when exceeded, require implementation of a regulatory-based response protocol.

NOTE: Some of the sample data tables include information for polychlorinated dibenzodioxins(PCDDs) and polychlorinated dibenzofurans (PCDFs). PCDDs and PCDFs constitute a family of 210 structurally related chemical compounds. The PCDDs and PCDFs reported for samplestaken for this site are predominantly low-potency compounds (e.g., the octa and heptacompounds); 2,3,7,8 tetrachlorodibenzo-p-dioxin, the most potent of the compounds, occurs at amuch lower concentration than the rest. The EPA has developed a tentative methodology--theToxicity Equivalency Factor (TEF) --for reporting the cumulative concentrations of all PCDDs and PCDFs in terms of their relative potency compared to 2,3,7,8-tetrachlorodibenzo-p-dioxin. ATSDR provides PCDD/PCDF TEF values in the data tables.

A. On-Site Contamination

<u>Tables 1</u> through <u>5</u> (<u>Appendix B</u>) present the maximum documented values of the onsite contaminants; these are considered in developing the Public Health Implications section of this assessment. This section summarizes from those tables the specific organic compound and metalfound at the highest concentrations. Identification of contaminants here and in the tables does not imply that human exposure has occurred or that exposure would actually result in adversehealth effects.

Surface Soils (Table 1)

phenanthrene 4,900 parts per million

arsenic (ppm)

5,100 ppm

Subsurface Soils (Table 2)

naphthalene 23,000 arsenic ppm

61,000 ppm

Groundwater (Table 3)

phenanthrene 3,900,000 ppb (parts per

zinc billion)

260,000 ppb

NAPL*; below ground (<u>Table 4</u>)

naphthalene 90,000,000 ppb metals not reported

Storm Water (Table 5)

pentachlorophenol 1,700 ppb

copper 15,000 ppb (mean

value)

B. Off-Site Contamination

<u>Tables 6</u> through <u>8</u> (<u>Appendix B</u>) present the maximum documented values of the offsite contaminants; these are considered in developing the Public Health Implications section of this assessment. This section summarizes from those tables the specific organic compound and metalfound at the highest concentrations. Identification of contaminants here and in the tables does not imply that human exposure has occurred or that exposure would actually result in adversehealth effects.

Surface Soils (Table 6)

benzofluoranthenes 1.3 ppm

arsenic 11 ppm (mean

value)

River Sediment (<u>Table 7</u>)

naphthalene 3,500 ppm (estimated

manganese value)

690 ppm

River Water

Studies conducted to date have not included data on river water quality at the site location.

Crayfish (Table 8)

naphthalene 57 ppb

zinc 15 ppm (mean

value)

Large Scale Sucker (<u>Table 8</u>)

naphthalene 78 ppb (mean

zinc value

7.4 ppm

^{*} nonaqueous-phase liquids; not readily soluble in water

C. Quality Assurance and Quality Control

Reference documents indicate that quality control protocols were followed for sampling andlaboratory analyses.

D. Physical and Other Hazards

ATSDR did not observe any substantive physical or other hazards associated with the site.

PATHWAYS ANALYSES

Discussion of specific human exposure pathways in this section does not imply that adversehealth effects are associated with them; health issues are discussed in the Public HealthImplications section. ATSDR identifies human exposure pathways by examining environmental and human components that might lead to contact with contaminants. A pathway analysis considers five elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and an exposed population. Completed exposure pathways are those for which the five elements are evident, indicating that exposure to acontaminant has occurred in the past, is currently occurring, or will occur in the future. ATSDRregards people who come in contact with contamination as exposed; for example, people whodrink water known to be contaminated, or who reside in an area with contaminated air, or whowork or play in contaminted soil are considered exposed. Potential exposure pathways are thosefor which one or more of the elements is not clearly defined but through which exposure isplausible. Potential pathways indicate that exposure to a contaminant could have occurred in thepast, could be occurring now, or could occur in the future. Elements of completed and potential exposure pathways are summarized in Tables 9 and 10 (Appendix B). Although the information available is ample for identifying several specific completed and potential human exposure pathways, data for confirming the degree and duration of exposure are not available.

A. Completed Exposure Pathways

Principal Completed Exposure Pathways

Air: On Site (During Operation)

Although sampling data are not available to identify the specific airborne contaminants or concentrations on site (or off site) while MB operated, ATSDR's observations of active woodtreatment plants and awareness of treatment chemical potency lead the agency to conclude that MB's workers were substantively exposed to volatilized chemicals and contaminated dust through inhalation. Visitors and trespassers were not exposed to as great a degree.

Process Chemicals, Wastes, Soils: On Site (During Operation)

ATSDR's observations at active wood treatment plants and awareness of associated chemicalpotency lead the agency to conclude that MB's workers, during operations, were substantively exposed to contaminants associated with process chemicals and wastes and contaminants insurface soils (<u>Table 1</u>), principally through skin contact and incidental ingestion. Some of the contaminants in process chemicals and wastes also are represented by sampling data obtained for nonaqueous-phase liquids (NAPLs) (<u>Table 4</u>) encountered below ground.

Air: Off Site (During Operation)

Nearby residents (some of whom reported plant-related odors) and nearby workers were exposed to volatilized organic chemicals and probably some contaminated dust through inhalation while the plant operated. Sampling data are not available to identify the specific airborne contaminants or their concentrations.

Other Completed Exposure Pathways

Because of the long-term potency of many of the contaminants, most of the exposures describedhere will continue until remediation is effected.

Soils: On Site

Evidence exists that trespassers occasionally breach the perimeter security fence intentionally and enter the site. Trespass is believed to result in exposure to contaminants in surface soils nowand in the future (until remediation is effected), principally through skin contact and incidentaling estion. Table 1 identifies some of the on-site surface soil contaminants and their respective concentrations.

Soils: Off Site

ATSDR believes residents and workers on nearby properties have been exposed, are now beingexposed, and will be exposed in the future to low levels of contaminants deposited on the groundby wind in off-site areas while the facility was in operation. Other urban sources are likely tohave contributed to the soil contamination. Exposures to contaminated surface soils occur offsite principally through skin contact and incidental ingestion. <u>Table 6</u> identifies some of theoff-site surface soil contaminants and their respective concentrations.

River Sediment: On Site and Off Site

Children have been observed walking and playing along the shoreline on site in the past, andODEQ representatives learned that two boys received skin burns on their legs while playing onthe adjacent downstream shoreline when the river level was low. Although the site securityfence extends into the river to prevent entry along the shoreline, ODEQ representatives note thatthe fence is breached periodically and does not fully prevent access to the on-site shoreline area. Therefore, ATSDR believes trespassers have been exposed, are now being exposed, and will be exposed in the future (until remediation is effected) to contaminants in surface sediments on site, principally through skin contact. Some former workers probably were also exposed through skincontact. Similar exposures can occur on the immediate downstream shoreline off site. Table 7 identifies some river sediments contaminants and their respective concentrations. Contaminants include those released from the site and possibly some released from additional sourcesupstream.

Crayfish and Fish: Off Site

The Oregon Health Division and Department of Fish and Wildlife have issued an advisorycautioning the public about commercial crayfish harvesting, and the shoreline area and paths to the shore are posted. ODEQ is not aware of any recreational crayfishing activity. ODEQbelieves that the advisory has deterred commercial crayfishing in the immediate area, but commercial crayfishing continues in downstream areas. This information indicates that

peoplewho fish and crayfish in the area adjacent to the site have been exposed, are now being exposed, and will be exposed in the future (for a period after remediation is effected) through ingestion tochemicals taken up by crayfish and fish. <u>Table 8</u> identifies some of the contaminants andrespective concentrations present in tissue samples taken from crayfish and the large scalesucker. Contaminants include types released from the site and possibly from additional sourcesalong the river.

Surface Water: Off Site

ATSDR believes that shoreline users, recreational and commercial fishermen, water skiers, andswimmers in the immediate area have been exposed, are being exposed now, and will be exposed contaminants released from the site in the future (until remediation is effected), principallythrough skin contact and incidental ingestion. Investigations conducted to date have not includedriver water quality data for the site vicinity. Table 1 (on-site surface soil), Table 3 (on-sitegroundwater), Table 4 (on-site below-ground NAPLs), and Table 5 (on-site storm water) identifysome of the contaminants released to the river; however, site-related concentrations in the riverare expected to be much lower than represented in the tables, which represent contaminants inon-site media, because of dilution and chemical degradation processes.

Air: On Site and Off Site (After Operations)

A nearby resident reports continuing periodic chemical odors both winter and summer. ATSDRnotes there are considerable chemical processing and petroleum storage activities on the westbank of the river and elsewhere in the area; the EPA's Toxic Chemical Release Inventory showsthat some of those activities release volatile chemicals to the air. ATSDR's review of current siteconditions and periodic remedial activities suggests that chemicals on site continue to volatilize least to some limited extent, especially during warm weather, and some contaminated particlesare likely to be transported by wind. Although wood treatment operations have ceased, thereports of continuing odors indicate that people in the immediate area (including workers on site and at nearby off-site businesses and also residents) are being exposed to airborne contaminants through inhalation. The specific source or sources of periodic chemical odor exposure mightnever be clearly defined, and air-related exposure might not terminate after site cleanup is effected.

B. Additional Exposure Pathway Issues

Potential Exposure Pathways

Soils: On Site

Remedial workers have the potential to be exposed to contaminants in soils (<u>Tables 1</u> and <u>2</u>) through incidental ingestion, inhalation, and skin contact as cleanup progresses if precautionarymeasures are unexpectedly inadequate for the conditions encountered. Future users of the siteafter remediation is complete also have the potential to be exposed to subsurface contaminantsthrough incidental ingestion, inhalation, and skin contact if the protective soil cover is breached.

Air: On Site

If, after remediation, chemicals in the subsurface (<u>Tables 2</u>, <u>3</u>, and <u>4</u>) volatilize and migrateupward through the protective soil cover, or if cracks develop in the soil cover, future site userscould be exposed to contaminants periodically through inhalation. Exposure, should it occurthrough these mechanisms, might not be substantive because the chemicals reported throughsampling are of low volatility.

Sediment: On Site and Off Site

Full remediation of site-related contaminated sediments along the shoreline and in the rivermight be difficult to achieve, and river currents conceivably could expose subsurfacecontaminants in the future. Therefore, ATSDR believes that persons using the shoreline afterremediation might be exposed to contaminants, principally through skin contact.

Other Pathway Considerations

Groundwater: On Site and Off Site

ATSDR representatives toured the site vicinity with city water department personnel, whoconfirmed that all residences and businesses in the area are connected to the public water system. ATSDR representatives also reviewed water well data on file with the U.S. Geological Surveyand the Oregon Water Resources and found no wells recorded at locations that would likely beaffected by the site. No apparent past or present users of groundwater contaminated by sitereleases (<u>Table 3</u>) were disclosed, and future users of that resource are unlikely.

PUBLIC HEALTH IMPLICATIONS

In this section, ATSDR discusses health effects of chemicals that people were exposed to on thesite, evaluates available health outcome data, and addresses specific community health concerns.

A. Toxicologic Evaluation

To determine whether people can get sick from exposure, ATSDR begins by estimating dailyexposure doses for each contaminant of concern by each route of exposure. We use informationabout levels of contaminants and about people's activities to estimate the exposure dose. Theestimated exposure dose is then compared to a Minimal Risk Level (MRL), which is an estimate of daily exposure to a contaminant below which noncancer disease is unlikely to occur. Todevelop the MRL, ATSDR relies on information from scientific studies of the effects of exposure to contaminants on people and animals. If an exposure dose exceeds an MRL, or if no MRL hasbeen developed, the estimated exposure dose is then compared to other health-based guidelines, such as the Environmental Protection Agency (EPA) reference dose, or to doses that resulted inadverse health effects in people or experimental animals as described in the scientific literature. These comparisons take into account the uncertainties inherent in relying on harmful effects produced in animals to predict the possibility of effects in people, as well as differences amongpeople.

In the United States population as a whole, cancer occurs in the lifetime of one in three people(8). It is very difficult for scientists to determine who will get cancer, but we do know that exposure to some contaminants can increase the chances (or risk) of getting cancer. Even if aperson gets cancer, scientists and physicians typically cannot know the cause of the

person'scancer. To determine whether exposure at this site might cause cancer, a numerical increase in the risk of cancer is estimated using the estimated exposure dose and a cancer slope factordeveloped by the EPA specifically for each cancer-causing chemical.

Although potential and completed exposure pathways are described in detail in the PathwaysAnaylses section, pathways and the people involved with the pathways are reiterated in thissection to provide context for the reader. Adverse health effects of exposure to contaminants of oncern are discussed. Health effects of exposure to some of the contaminants found at this siteare not known.

ATSDR concludes that plant workers were exposed to the wood treating chemicals arsenic, pentachlorophenol, and creosote as well as to dioxins/furans (predominantly the low-potencycompounds) during the plant's operation. These exposures are believed to have been throughincidental ingestion (i.e., swallowing by accident during other swallowing activities) of soils onsite. These exposures were at levels of public health concern. Additional exposures which mayhave occurred through direct skin contact with the chemicals or inhalation of the vapors and dustin the air could increase the health risk. Workers could have inhaled additional chemicals thatoriginated off the site; several other industrial facilities in the site's vicinity have reported (in the EPA Toxic Release Chemical Inventory [TRI]) releasing unknown concentrations of chemicalsinto the air. A discussion of potential health effects associated with worker exposure to eachchemical or chemical class is presented later in this section.

Trespassers and visitors to the plant during its operation would have been exposed to the samechemicals to which the workers were exposed. Because of the short exposure time, it is highlyunlikely that they would become ill from being exposed to most areas of the site.

Two boys playing in shallow water along the shoreline on or adjacent to the site reportedlyreceived skin burns, apparently from contact with hazardous chemicals. The site is believed tobe the source of the contamination. Other people might encounter chemicals along the shorelineat levels capable of burning the skin. Site-related chemicals that can burn the skin are discussed attering this section.

People who eat contaminated fish and shellfish can be exposed to contaminants. Evaluation of contaminant levels in fish and shellfish indicate that, for people who subsist on crayfish or suckers over a long time, health effects from exposure to polychlorinated dibenzodioxins and dibenzofurans might be expected. It is not known whether anyone ingests contaminated fish tothat extent. Those potential health effects are discussed later in this section.

Nearby residents and workers were exposed when they breathed contaminated air during theplant's operation. The site might not have been the only source of air contaminants. Othernearby facilities have reported releases. Because there is no available air data, those inhalationexposures cannot be evaluated. Residents have reported health effects that are known to be experienced by individuals with no known exposure to hazardous waste, but are also consistentwith inhalation exposure to site-related contaminants. Site-related chemicals that can cause thosehealth effects are discussed later in this section.

Residents might also be exposed to airborne contaminants during remediation. Real-time airmonitoring would show whether airborne contaminants released by remedial activities would beat a level of health concern.

People who use the Willamette River near the site for recreation might be exposed by skincontact and incidental ingestion to any contamination that migrated into the river water. Studiesconducted to date have not included river water sampling. It is likely that site-related contaminants are diluted enough in the water that there is no health threat to recreational waterusers.

Although the facility has been closed and fenced, remedial workers and people who trespass onto the site or wander near the site at the river's edge can be exposed to contaminants by incidentallyingesting on-site soil and sediments in the river and at the river's edge. Because remedialworkers wear protective gear and because intruders are not likely to stay on the site for long, remedial workers and others are not likely to swallow contaminants often; it is unlikely that theywill get sick this way. However, people who wander near the site at the river's edge might expose their skin to contaminated sediments. Contaminants in the sediment do not appear to beat levels that would cause any effects; however, in one case, two children who waded near thesite reportedly received skin injuries consistent with the type of damage exposure to site-related contaminants can cause.

People who live or work nearby can incidentally ingest contaminants in soils on properties wherethey live or work. Results from several residential soil samples show that contaminant levels areso low that it is unlikely that anyone will get sick from incidentally ingesting soil. Limited soildata from adjacent industrial property also show that contaminant levels are so low that workersare unlikely to get sick from incidental soil ingestion; however, we do not have enough soilsample information to be reasonably sure that the contaminant concentrations found represent thetrue concentrations in that area.

Potential Health Effects of Chemicals

Sickness related to occupational exposures to the wood treating chemicals arsenic, pentachlorophenol, and creosote is discussed below. Dioxins and furans are contaminants commonly found with pentachlorophenol at wood-treating facilities and have been found at this site. Therefore, those chemical groups are included in this discussion. Health effects of eating dioxin-contaminated fish are included in this discussion as well.

Coal-tar creosote is a complex mixture of more than 300 compounds, including polycyclicaromatic hydrocarbons (PAHs), phenol and cresols. PAHs have been found at this site. There are no sampling data confirming phenol and cresols on site, and compounds related to phenols(substituted phenols) were found only at very low levels in on-site soil. However, becauseworkers worked with creosote, we assume that they were exposed to phenol and cresols. Therefore, health effects of exposure to phenol, cresols, and PAHs are discussed. Because these chemicals can injure the skin upon contact and the respiratory system upon inhalation, potential health effects for people who wander along the shoreline and for people who live around the site and breathe contaminated air are included in this discussion as well. There are no environmental data confirming that the latter two groups of people are exposed at levels of health concern. However, health effects consistent with exposure to creosote have been reported.

Arsenic

Arsenic is a naturally occurring element. Pure arsenic is a gray metal-like material; arsenic issusually found combined with such other elements as oxygen, chlorine, and sulfur. Arseniccombined with these elements is called inorganic arsenic. Inorganic arsenic is used as

apreservative for wood to make it resist rot and decay; it is predominantly inorganic arsenic whichhas been found as a contaminant at this site.

Plant workers

Plant workers were exposed to arsenic through incidental ingestion, inhalation and skin contact. The maximum arsenic concentration found on site was 5,100 parts per million (ppm) in soil.

Inorganic arsenic has been recognized as a human poison since ancient times. There arenumerous studies conducted on people who swallowed inorganic arsenic at doses similar to thoseATSDR estimates workers received. The results of those studies are discussed below (9).

Perhaps the single most characteristic effect of long-term oral exposure to inorganic arsenic is apattern of skin changes. This pattern includes a darkening of the skin and the appearance ofsmall warts or corns on the palms, soles, and torso. While these skin changes are not considered to be a health concern in their own right, a small number of the corns might ultimately developinto skin cancer. Swallowing arsenic has also been reported to increase the risk of cancer in theliver, bladder, kidney, and lung. The Department of Health and Human Services (DHHS) and the EPA have determined that arsenic causes cancer in humans. Arsenic in the soil at the site isat levels which can lead to a low increased risk of cancer in workers.

Other effects of exposure to arsenic at levels workers may have sustained included irritation of the stomach and intestines, with symptoms such as pain, nausea, vomiting and diarrhea; impairednerve function causing "pins and needles" in the hands and feet; blood vessel damage; anemia; and liver damage. Off-site arsenic exposures of this magnitude are probably not possible.

Pentachlorophenol (PCP) and dioxins/furans

PCP is a substance made from other chemicals. It does not occur naturally. PCP is used as awood preservative and is released to the air by evaporation from treated wood surfaces. It entersthe soils as a result of spills. Polychlorinated dibenzo-*p*-dioxins and dibenzofurans, also calleddioxins and furans, are classes of compounds that do not occur naturally and are not intentionallymanufactured (except as reference standards for analytic laboratories). However, they can beinadvertently produced as impurities. Technical grade PCP usually contains dioxins and furansas impurities.

Plant workers

Plant workers were exposed to PCP and dioxins/furans through incidental ingestion, inhalationand skin contact. The maximum PCP concentration found on the MB site was 4,800 ppm in soil. Dioxins and furans concentrations are given as a single 2,3,7,8-tetrachlorodibenzo-*p*-dioxin toxicequivalent concentration; the maximum dioxin/furan concentration was 0.38 ppm. Althoughthere are no data from which to estimate actual inhalation or skin exposure doses, workers atwood treatment facilities are known to inhale and take in through the skin significant levels of PCP and dioxins/furans.

Because of PCP's frequent contamination with dioxins/furans, wood-treatment plant workerswho work with PCP are generally exposed to dioxins/furans as well. Studies

conducted onwood-treatment workers exposed to PCP actually investigate health effects of exposure to PCPcontaminated with dioxins/furans (10).

Various studies of wood treatment workers exposed to PCP show that the blood, kidneys, andskin can be affected (10). Exposure was associated with aplastic anemia (defective functioning of the blood-forming cells), reduced kidney function, and skin and eye irritation. The lengthsand levels of exposure that cause harmful effects in people are not well defined. Studies in ratsand cows also show an association between PCP exposure and blood, kidney, and skin disorders. Exposure to PCP, dioxins and furans is known to cause chloracne in people. Chloracne is a skinproblem characterized by cysts and abscesses on the face, chest, and abdomen.

The EPA has classified PCP and dioxins/furans as probable human carcinogens (10,11). PCP isclassified as a probable human carcinogen because studies have shown an association betweeningesting pure PCP and cancer in mice; dioxins and furans are classified as probable humancarcinogens because studies have shown an association between dioxin ingestion and cancer inrats. The levels of PCP and dioxins/furan in the site's soil correspond to a low increased risk ofcancer for workers.

Crayfish and sucker eaters

ATSDR staff members estimated dioxin/furan exposure doses for people who eat contaminated crayfish and suckers on a regular basis. We assumed that people rely solely on crayfish and suckers as their sole source of fish and shellfish (we assumed they ate between one and four sixounce meals of crayfish and/or suckers a month). The levels of dioxin/furans in crayfish andsuckers correspond to levels associated with a low increased risk of cancer for people whosubsist on crayfish and/or suckers for many years. In addition, although there have been nowell-substantiated reports of reproductive toxicity in people who ate dioxins/furans, studies inrats indicate that eating dioxin might cause spontaneous abortions (11). It is not known whetheranyone relies on crayfish and/or suckers harvested near the site as their sole source of fish andshellfish. For people who occasionally eat contaminated crayfish, no adverse health effects are expected.

<u>Creosote, phenol, cresol,</u> <u>and polycyclic aromatic hydrocarbons (PAHs)</u>

Coal-tar creosote is a widely used wood preservative. It contains phenol, cresol, and PAHs. PAHs make up a class of chemicals. There are more than one hundred PAHs.

Plant workers

Plant workers were exposed to creosote through incidental ingestion, inhalation and skin contact. Because creosote is a mixture, its concentration cannot be measured. PAHs, however, were measured in soil. Maximum concentrations of carcinogenic PAHs found on site were 420 ppmbenzo(a)anthracene; 210 ppm benzo(a)pyrene; 1,000 ppm benzofluoranthenes; 1,900 ppmchrysene; 22 ppm dibenz(a,h)anthracene; and 56 ppm indeno(1,2,3-cd)pyrene.

There is little information on the health effects of creosote exposure in workers. Brief workerexposure to large amounts of creosote can harm the skin, eyes, nervous system, and

kidneys. Studies of workers exposed for a longer time to lower levels of creosote through the skindescribe burns and irritation of the skin and eyes as the most frequent symptoms.

In addition, animal studies of phenol exposure and human studies of cresol exposure indicate that inhalation of those compounds can irritate the respiratory tract (13,14). Creosote inhalationeffects are further discussed below in the Community Health Concerns Evaluation section.

Based on animal studies, the DHHS and the EPA have decided that the PAHsbenzo(a) anthracene, benzo(a)pyrene, benzofluoranthenes, chrysene, dibenz(a,h)anthracene andindeno(1,2,3-cd)pyrene probably cause cancer in people (15). Those PAHs have been found onsite. In laboratory experiments, they have caused tumors in animals when the animals breathedthem, ate them, or had long periods of skin contact with them. Studies of humans show thatindividuals exposed by breathing or skin contact for long periods to mixtures that contain PAHsand other compounds can also develop cancer. PAHs in the soil at the site are at levels whichcan lead to a low increased risk of cancer for workers.

Nearby residents

Little is known about the health effects of coal-tar creosote inhalation; however, mouse studies show inhalation of beechwood creosote, which has some of the same components as coal-tarcreosote, can cause irritation to the respiratory tract (12).

Phenol and cresols are constituents of coal-tar creosote. Animal studies of phenol exposure andhuman studies of cresols exposure indicate that those compounds can irritate the respiratory tractwhen inhaled (13,14). Although the results do not give a time frame, irritation probably beginswithin minutes. Guinea pigs exposed to phenol at higher concentrations for a longer time period(more than a month) developed pneumonia, bronchitis and other serious lung problems (13). Pulmonary edema and hemorrhage and perivascular sclerosis (hardening of the tissue) in thelungs was seen in animals exposed to cresols for one month (14).

Pentachlorophenol is another chemical commonly used at the site. There is very littleinformation on inhalation effects of pentachlorophenol; however, it appears to causeinflammation of the upper respiratory tract and bronchitis in people upon chronic, high-doseoccupational exposure in the presence of other chemicals (10).

Since we do not know what chemicals people were smelling or their concentrations, we cannot determine whether the health effects mentioned above could be related to the site.

Historical wading exposure

Boys were playing in the river at the edge of the site when they reportedly received burns. Sampling of river sediment found chemicals that are also found in creosote. Several reports inthe literature describe skin irritation (reddening and itching), burns, and squamous papillomas(warts) that appeared following acute or prolonged skin contact with coal-tar creosote. Coal-tarcreosote also induces phototoxicity of the skin (12). A phototoxic material makes the skin moresusceptible to damage such as sunburn and blisters upon exposure to light. Thus, the reportedburns are consistent with contact with creosote.

B. Health Outcome Data Evaluation

The State of Oregon maintains vital statistics (i.e., information about births and deaths). That information is collected at the county level. Oregon has neither a cancer nor a birth defects registry. No health studies on the workers at or the community around the site were found.

County-level data contain information about the whole county. Elevated death rates for acommunity as small as that working at or living near the MB site would not affect county rates as a whole. County data might provide information about trends in a community, but only acommunity-specific analysis can truly attempt to answer whether cancer rates near the site areelevated. If an elevated death rate is seen at the county level, we cannot prove its relation to thesite. Likewise, the absence of an elevated death rate does not mean that the site has had no effecton the death rate in the community. For these reasons, ATSDR staff members did not examinemortality rates.

C. Community Health Concerns Evaluation

Several health concerns were expressed at the ATSDR-sponsored public availability meeting in Portland on February 23, 1994. Those concerns are addressed in this section.

Chemical odors associated with breathing difficulties

There are no data on contaminant concentrations in air, so we do not know whether the odorpeople smelled was from chemicals from the site. We cannot determine whether people couldget sick from the odor. We do know some of the health effects from inhalation of creosote and associated chemicals found on the site. Please refer to the Creosote, phenol, cresol, and polycyclic aromatic hydrocarbons (PAHs), Nearby residents discussion in the Toxicologic Evaluation section above. Breathing difficulties are consistent with exposure to site-related contaminants, but are also non-specific symptoms commonly experienced by individuals with noknown exposures to hazardous waste.

Cancer

As discussed in the Toxicologic Evaluation section above, cancer occurs in the lifetime of one inthree people (8). It is very difficult for scientists to determine who will get cancer. Further, ifsomeone gets cancer, scientists and physicians typically cannot know the cause of the person'scancer. We do know, however, that some site-related chemicals are carcinogens; at sufficientlyhigh doses, they are capable of causing specific cancers. Arsenic is a known human carcinogen; pentachlorophenol, dioxin, and creosote (as well as one of its parts, the polycyclic aromatichydrocarbons) are probably human carcinogens.

Plant workers were exposed to carcinogens at levels of public health concern. We estimate a lowto moderate increased cancer risk for workers exposed to arsenic, PCP, dioxin and PAHs throughincidental soil ingestion. Additional exposure through inhalation or skin contact with those contaminants could increase the cancer risk.

We do not know to what chemicals or at what concentrations nearby residents were or are being exposed by breathing the air.

Lung Spots

Lung spots is a general descriptive term and is not actually a disease. A resident who lived nearthe site reported that the physician took a chest X-ray, which showed a spot. Although the the did not smoke, second-hand smoke from cigarettes might contribute to

spotformation. There are additional conditions that can cause spots in the lungs, including a commoncold complicated by pneumonia, other bacterial or viral infections, or the presence ofmanufactured fibers. Without substantive specific information about the spots, we cannot give any opinion about their possible cause.

Chronic bronchitis and lung tissue damage

We have no information about contaminant levels in the air near the site or about length of exposure. It is not possible to determine whether bronchitis and lung tissue damage would be expected in nearby residents. Concerned individuals should discuss potential chemical exposures when consulting their physicians.

Chronic bronchitis is among the most common conditions afflicting modern populations (16). Chronic bronchitis results from prolonged irritation of the bronchial membrane and causescoughing and excessive secretion of mucus for extended periods. By far the most common causeof chronic bronchitis is cigarette smoking, but air pollution and industrial fumes and dustirritation are also important irritants (17). Hereditary background can also play an important role(16). Chemicals used at the plant are respiratory irritants in people and animals and, at sufficientlevels for sufficient amounts of time, have caused bronchitis and lung tissue damage in animals.

Safety of produce harvested from Sauvies Island

Sauvies Island is approximately 1½ miles downstream from the site. ATSDR staff membersbelieve that contaminants originating from the site would be sufficiently diluted after entering theriver and traveling 1½ miles to pose no hazard from ingested island produce that is irrigated withriver water.

Burns to skin exposed to sediments

Youngsters reportedly received burns when playing in the river at the edge of the site. Samplingof river sediment found chemicals that are also found in crossote. The children's burns are consistent with contact with crossote. Please refer to the Crossote, phenol, crossol, and polycyclicaromatic hydrocarbons (PAHs), Historical wading exposure discussion in the Toxicologic Evaluation section.

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PUBLIC HEALTH ASSESSMENT

McCORMICK & BAXTER CREOSOTING COMPANY (PORTLAND) PORTLAND, MULTNOMAH COUNTY, OREGON

CONCLUSIONS

- 1. ATSDR considers the site to have been a public health hazard for former plant workers becauseof past ingestion exposure to arsenic, creosote, pentachlorophenol, polychlorinateddibenzodioxins, and dibenzofurans at levels of public health concern. Past estimated exposuredoses indicate a low to moderate increased cancer risk. Additional exposure via inhalation orskin contact could increase the health risk.
- 2. ATSDR considers the site to pose a public health hazard because people might encounterhazardous chemicals along the shoreline on or near the site at levels that can damage the skin, aswas reported to have happened to two boys.
- 3. Dioxin levels would pose a public health hazard for people subsisting on contaminated crayfishand suckers.
- 4. The site poses an indeterminate public health hazard for nearby residents because of past, presentand future inhalation exposure. Insufficient information regarding air contaminant levelsprevents the evaluation of inhalation exposure. Some of the information needed for such anevaluation, especially information regarding past exposures, might never be acquired. Community members reported odors and lung effects, including bronchitis, breathing difficulties,lung tissue damage, lung spots, and lung cancer. These self-reported symptoms have not beenconfirmed by ATSDR. The source or sources of air contaminants causing odors that continue tobe reported by community members has not been determined. The adverse lung symptoms arenon-specific symptoms known to be experienced by people with no known exposure tohazardous waste, but they are also consistent with exposure to site-related contaminants.
- 5. ATSDR considers the site to pose an indeterminate public health hazard to workers on the adjacent industrial property because of incidental soil ingestion. Limited soil data show that contaminant levels are so low that workers are unlikely to get sick from incidental soil ingestion; however, we do not have enough soil sampling information to be reasonably sure that the contaminant concentrations found represent the true concentrations in that area.
- 6. ATSDR considers the site to pose no apparent public health hazard for other exposed populations at the present. However, the site should not be developed or otherwise accessed by the publicuntil remediation measures are accomplished in a manner that effectively prevents humanexposures from occurring at levels of public health concern.
- 7. Should additional data become available indicating that people are being exposed tocontaminants at levels of public health concern, the conclusions drawn above will be revised.

- 8. With a few exceptions, media sampling conducted to date provides ATSDR with sufficientinformation for examining public health issues. Additional sampling appears appropriate for thefollowing:
 - a. soils on adjacent industrial property,
 - b. air quality on site while air-release-related remediation activities are in progress, and
 - c. ambient air quality where residents continue to express concern about odors.

RECOMMENDATIONS

Information identifying appropriate agencies to implement recommendations is contained in the Public Health Actions section.

Site/Area Characterization Recommendations

- ODEQ reports that the industrial property southeast of the site is undergoing an
 environmentalassessment because of past industrial practices. ATSDR recommends
 that the soil analytical databe reviewed for evidence of contaminants associated with
 the wood treatment facility. Additional soil sampling should be conducted on the other
 adjoining industrial properties.
- 2. Conduct real-time air monitoring on site while remedial activities that are likely to affect airquality are in progress. Particulates should be analyzed for semivolatiles and the followingmetals: arsenic, chromium, copper and zinc. The vapor phase should be analyzed forsemivolatiles. A detection limit suitable for contaminants at a level which can cause healtheffects with chronic exposure should be used.
- 3. Conduct ambient air monitoring nearby where residents have continuing concerns about odors, which could be from multiple sources. If monitoring and analyses indicate that airbornecontaminants are present at a level of public health concern, consider whether it is feasible toidentify the source or sources and to implement measures to reduce releases. Particulates shouldbe analyzed for semivolatiles and the following metals: arsenic, chromium, copper and zinc. Theyapor phase should be analyzed for semivolatiles and common industrial volatiles. A detection limit suitable for contaminants at a level which can cause health effects with chronic exposures hould be used.

Cease/Reduce Exposure Recommendation

1. Prevent the site from being developed or otherwise accessed by the public until remediationmeasures are accomplished in a manner that effectively prevents human exposures fromoccurring at levels of public health concern, as described in the summary.

Health Activities Recommendation Panel (HARP) Recommendations

In accordance with the Comprehensive Environmental Response, Compensation, and LiabilityAct of 1980, as amended, the data and information developed in the Public Health Assessmentfor the McCormick and Baxter site in Portland, Oregon, have been evaluated for appropriatefollowup with respect to health activities. Available information indicates that exposure ofindividuals to contaminants at levels of public health concern has occurred in the past and mightstill be occurring. Plant workers were exposed to chemicals at levels of public health concern inthe past. People might encounter acutely hazardous levels of chemicals along the shoreline on ornear the site. There is potential public health concern for persons who ingest shellfish from thatsite. Additionally, community members have expressed public

health concerns aboutnon-specific symptoms known to be experienced by people with no known exposure tohazardous waste, but that are also consistent with exposure to site-related contaminants. Theseself-reported symptoms have not been confirmed by ATSDR. ATSDR recommends that community and health professions education should be conducted at this site. The education would focus on the actions of exposure to chemicals involved in wood treatment. If a population can be identified that has been exposed to wood treatment process chemicals from the site, ATSDR will evaluate whether a health investigation is appropriate. Worker exposures will bereferred to the appropriate occupational health authorities.

If more information indicating that human exposure to hazardous substances is occurring or hasoccurred at levels of public health concern becomes available, ATSDR will reevaluate this site or any additional indicated followup.

PUBLIC HEALTH ACTIONS

The purpose of the Public Health Action Plan (PHAP) is to ensure that this public health assessment not only identifies public health hazards but also provides a plan of action designed mitigate and prevent adverse human health effects resulting from exposure to hazardoussubstances in the environment.

EPA or ODEQ will monitor the air on site while remedial activities that are likely to affect airquality are in progress.

Based on the Health Activities Recommendation Panel's determination that community andhealth professions education activities are indicated, ATSDR's Division of Health Education willdetermine appropriate site-specific health education activities for health professionals and community members through a needs assessment.

The question of whether an exposed population can be identified is being pursued as we proceedwith this assessment and the release of this information.

Future environmental or health outcome data might determine the need for additional actions at the McCormick and Baxter site.

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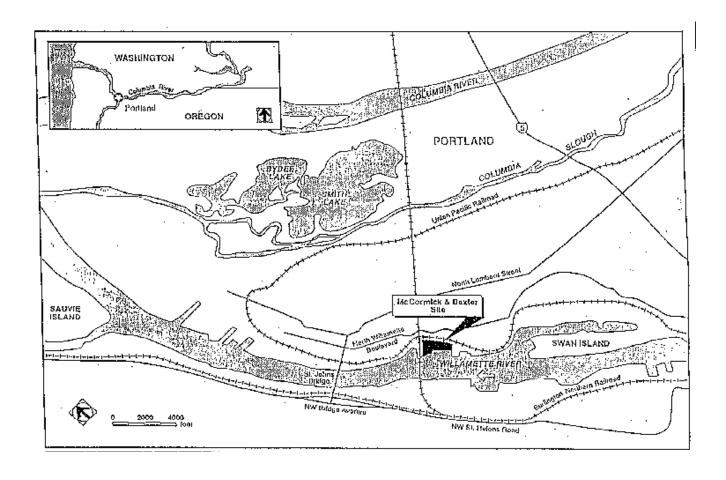
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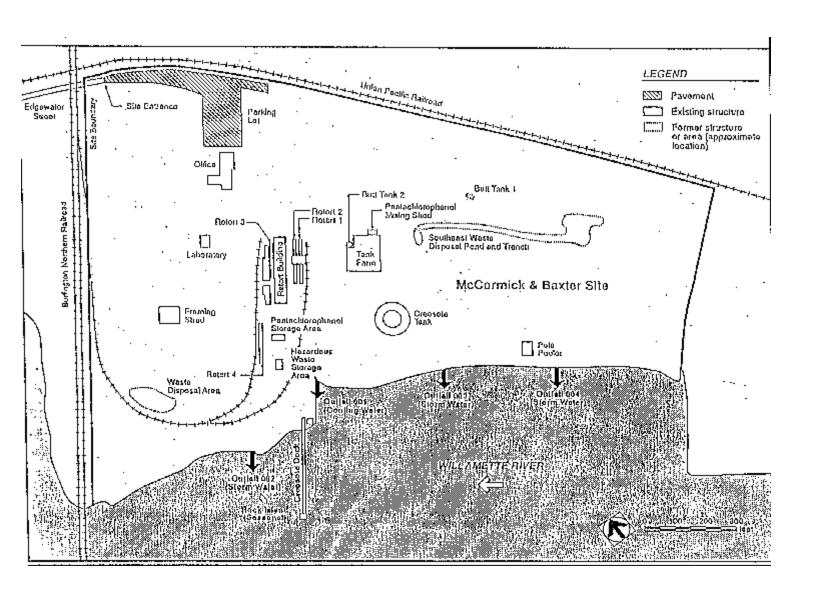
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PUBLIC HEALTH ASSESSMENT

McCORMICK & BAXTER CREOSOTING COMPANY (PORTLAND) PORTLAND, MULTNOMAH COUNTY, OREGON

APPENDIX A--SITE MAPS

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Figure 1 Site Location Map



Figure 2 Principal Site Features

APPENDIX B--CONTAMINANT AND PATHWAY TABLES

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Contaminants--On-Site Surface Soils

Contaminants--On-Site Subsurface Soils

Contaminants--On-Site Groundwater

Contaminants--On-Site NAPL (Below Ground)

Contaminants--On-Site Storm Water (Unfiltered)

Contaminants--Off-Site Surface Soils

Contaminants--Off-Site Sediment

Contaminants--Off-Site: Crayfish, Large Scale Sucker

<u>Summary--Completed Pathways and Associated Health-Related Information</u>

Summary--Potential Pathways and Associated Health-Related Information

ACRONYMS, ABBREVIATIONS

ND

ppm

ppb

E

M

LM

L

EMEG

CREG

RMEG

PMCL

LTHA

AL

NAPL

PCDD/PCDF

not detected

parts per million

parts per billion

estimated value

mean value

might be less than the stated mean value

less than the stated value

Environmental Media Evaluation Guide

Cancer Risk Evaluation Guide for 1x10-6 excess cancer risk

Reference Dose Media Evaluation Guide

Proposed Maximum Contaminant Level

Lifetime Health Advisory

Action Level

nonaqueous-phase liquids

polychlorinated dibenzodioxins and polychlorinated dibenzofurans, presented as 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicequivalents. See discussion under Environmental Contamination and Other Hazards section.

Table 1 Contaminants--On-Site Surface Soils

Contaminants	Concentration	 Comparison Values	
	(ppm)		

					ppm	Sourc
acenaphthylene	50	1990	none			
benz(a)anthracene	420E	1990	none			
benzo(a)pyrene	210	1990	0.1	CREG		
benzo(e)pyrene	620E	1990	none			
benzo(ghi)perylene	66	1990	none			
benzofluoranthenes	1,000E	1990	none			
carbazole	1,200E	1990	none			
chrysene	1,900E	1990	none			
dibenz(a,h)anthracene	22	1990	none			
dibenzofuran	290E	1990	none			
indeno(1,2,3-cd)pyrene	56	1990	none			
2-methylnaphthalene	140	1990	none			
naphthalene	42	1990	none			
PCDD/PCDF (toxic equivalents *)	0.38	1990	0.0007	CREG		
pentachlorophenol	4,800E	1990	6	CREG		
phenanthrene	4,900	1990	none			
2,3,4,5-tetrachlorophenol	65E	1990	none			
arsenic	5,100	1990	0.4	CREG		
beryllium	0.58	1990	0.2	CREG		
lead	150	1990	none			
Ref. (<u>1</u>)						

<u>Table 2</u> Contaminants--On-Site Subsurface Soils

Contaminants	Maximum Concentration (ppm)	-	Comparison Values	ppm Source
acenaphthylene	13	1992	none	
benz(a)anthracene	570E	1992	none	
				7

benzo(a)pyrene	170	1992	0.1	CREG
benzo(e)pyrene	150	1992	none	
benzo(ghi)perylene	30	1992	none	
benzofluoranthenes	460	1992	none	
carbazole	460E	1992	none	
chrysene	770E	1992	none	
dibenz(a,h) anthracene	22	1992	none	
indeno(1,2,3-cd) pyrene	64	1992	none	
naphthalene	23,000	1992	none	
PCDD/PCDF (toxic equiv-alents)	0.037	1992	0.0007	CREG
pentachlorophenol	5,200E	1992	6	CREG
phenanthrene	3,600	1992	none	
arsenic	61,000	1992	0.4	CREG
copper	19,000	1992	none	
Ref. (<u>1</u>)				

<u>Table 3</u> Contaminants--On-Site Groundwater

Contaminants	Maximum Concentration (ppb)	Sample (year)	Comparison Values		ppb	Source
acenaphthene	2,000,000	1991	600	RMEG		
acenaphthylene	150,000	1991	none			
anthracene	620,000	1991	3,000	RMEG		
benz(a)anthracene	240,000	1991	0.1	PMCL		
benzo(a)pyrene	100,000	1991	0.005	CREG		
benzo(e)pyrene	5,300	1991	none			
benzo(ghi)perylene	20,000	1991	none			
benzofluoranthenes	160,000	1991	0.2	PMCL		

chrysene	190,000	1991	none	
dibenz(a,h)anthracene	17,000	1991	0.3	PMCL
fluorene	1,800,000	1991	400	RMEG
fluoranthene	2,000,000	1991	400	RMEG
indeno(1,2,3-cd)pyrene	5,200	1991	0.4	PMCL
naphthalene	2,400,000	1991	20	LTHA
PCDD/PCDF (toxic equivalents)	0.20	1991	0.00001	CREG
pentachlorophenol	1,200,000	1991	0.3	CREG
phenanthrene	3,900,000	1991	none	
pyrene	1,100,000	1991	300	RMEG
2,3,4,5-tetrachlorophenol	190E	1991	none	
arsenic	9,000	1991	3	EMEG
chromium	12,000	1991	10,000	RMEG
chromium +6	120	1991	50	RMEG
copper	5,400	1991	1,300	AL
zinc	260,000	1991	3,000	RMEG
Ref. (<u>1</u>)				

<u>Table 4</u> Contaminants--On-Site NAPL Below Ground

Maximum Concentration (ppb)	Sample (year)	Comparison Values		ppb	Source
30,000,000	1991	600	RMEG		
490,000	1991	none			
820,000	1991	none			
610,000	1991	0.1	PMCL		
170,000	1991	0.2	PMCL		
160,000	1991	none			
32,000,000	1991	400	RMEG		
	Concentration (ppb) 30,000,000 490,000 820,000 610,000 170,000 160,000	Concentration (ppb) (year) 30,000,000 1991 490,000 1991 820,000 1991 610,000 1991 170,000 1991 160,000 1991	Concentration (ppb) (year) Value 30,000,000 1991 600 490,000 1991 none 820,000 1991 none 610,000 1991 0.1 170,000 1991 0.2 160,000 1991 none	Concentration (ppb) (year) Values 30,000,000 1991 600 RMEG 490,000 1991 none	Concentration (ppb) (year) Values 30,000,000 1991 600 RMEG 490,000 1991 none

fluorene	36,000,000	1991	400	RMEG
naphthalene	90,000,000	1991	20	LTHA
pentachlorophenol	830,000	1991	0.3	CREG
phenanthrene	88,000,000	1991	none	
pyrene	30,000,000	1991	300	RMEG
Ref. (<u>1</u>)				

<u>Table 5</u> Contaminants--On-Site Storm Water (Unfiltered)

Contaminants	Maximum Concentration	Sample (year)	Comparison Values			
	(ppb)				ppb	Source
PCDD/PCDF (toxic equivalents)	0.024	1991	0.00001	CREG		
pentachlorophenol	1,700	1991	0.3	CREG		
tetrachlorophenols	68E	1991	none			
arsenic	7,600M	1991	3	EMEG		
copper	15,000M	1991	1,300	AL		
zinc	8,200M	1991	3,000	RMEG		
Ref. (<u>1</u>)						

<u>Table 6</u> Contaminants--Off-Site Surface Soils

Contaminants	Maximum Concentration (ppm)	Sample (year)	Compai Valu		ppm	Source
benz(a)anthracene	A- ND B- 0.21E C- 0.055E D- 0.33 E- ND	1991	none			
benzo(a)pyrene	A- ND B- 0.28 C- 0.30E D- 0.26 E- ND	1991	0.1	CREG		

benzo(e)pyrene	A- ND B- 0.32 C- 0.21E D- 0.70 E- ND	1991	none	
benzo(ghi)perylene	A- ND B- 0.24 C- 0.17E D- 0.26 E- ND	1991	none	
benzofluoranthenes	A- ND B- 0.47 C- 0.35E D- 1.3 E- ND	1991	none	
carbazole	A- ND B- 0.022 C- ND D- 0.052 E- ND	1991	none	
chrysene	A- ND B- 0.36 C- 0.31E D- 1.1 E- ND	1991	none	
dibenz(a,h) anthracene	A- ND B- ND C- ND D- 0.098 E- ND	1991	none	
indeno(1,2,3-cd) pyrene	A- ND B- 0.3 C- 0.20E D- 0.042 E- ND	1991	none	
naphthalene	A- 0.056E B- 0.025 C- 0.11E D- 0.035 E- ND	1991	none	
PCDD/PCDF (toxic equivalents)	A- 0.0000081L B- 0.0005 C- 0.000054L D- 0.0011 E- 0.000012L	1991	0.000002	EMEG

phenanthrene	A- 0.054E B- 0.16 C- 0.12E D- 0.27 E- ND	1991	none	
arsenic	A- 3.4E B- 11M C- 6.2 D- 17 E- 2.7E	1991	0.4	CREG

Table 6. Contaminants-Off-Site Surface Soils, notes

- A- Samples from residential area beyond top of bluff
- B- Samples from access road
- C- Samples from adjacent industrial property to the north and from slope of bluff
- D- Single sample taken on site beside south property line that might represent conditions off-site in that area.
- E-Background sample taken near university Ref. (1)

Table 7 Contaminants--Off-Site River Sediment

Contaminants	Maximum Concentration (ppm)	Sample (year)	Comparison Values		ppm	Source
acenaphthylene	17	1990	none			
benz(a)anthracene	170	1990	none			
benzo(a)pyrene	58	1990	0.1	CREG		
benzo(e)pyrene	50	1990	none			
benzofluoranthenes	170	1990	none			
chrysene	170	1990	none			
dibenz(a,h) anthracene	87	1990	none			
dibenzofuran	620	1990	none			
1,4-dichlorobenzene	0.53	1990	none			
2,6-dinitro-toluene	22	1990	none			
endrin aldehyde	0.00056E	1990	none			

indeno(1,2,3-cd) pyrene	87	1990	none	
2-methylnaphthalene	1,300	1990	none	
4-methylphenol	0.90M	1990	none	
naphthalene	3,500E	1990	none	
PCDD/PCDF (toxic equiv-alents)	0.0027	1990	0.00005	EMEG
pentachloro-phenol	7.2	1990	6	CREG
phenanthrene	1,900E	1990	none	
arsenic	18E	1990	0.4	CREG
beryllium	0.9	1990	0.2	CREG
lead	44	1990	none	
manganese	690	1990	300	RMEG
Ref. (<u>1</u>)				

<u>Table 8</u> Contaminants--Off-Site: Crayfish, Large Scale Sucker

Contaminants	Maximum Concentration (via wet weight) (organic compoundsppb) (metalsppm)		Comparison Value	
		Crayfish		Sucker
acenaphthylene	21	57	none	
fluorene	ND	46	none	
naphthalene	57 78M		none	
PCDD/PCDF (toxic equiv- alents)	0.0056LM	0.0055LM	none	
pyrene	ND	17E	none	
arsenic	0.24E	ND	none	
chromium	1.6	0.55	none	
copper	13	0.5	none	

zinc	15M	7.4	none	
Sample date not Ref. (1)	reported			

<u>Table 9</u> Summary--Completed Pathways and Associated Health-Related Information

PATHWAY NAME:	Air (on site) during operations	Air (off site) during operations	Process chemicals, wastes, soils (on site) during operations	Soils (on site)	Soils (off site)
Source:	McCormick & Baxter	McCormick & Baxter	McCormick & Baxter	McCormick & Baxter	McCormick & Baxter
Medium:	Air	Air	Chemicals, wastes, soils	Surface soils	Surface soils
Exposure Point:	On site	Off site	On site	On site	Off site
Exposure Route:	Inhalation	Inhalation	Skin contact, ingestion	Skin contact, ingestion	Skin contact, ingestion
Receptor Population:	Workers, visitors, trespassers	Nearby residents, nearby workers	Workers	Trespassers	Nearby residents, nearby workers
Exposure Period:	Past	Past	Past	Present, future	Past, present, future
Number Exposed:	Workers about 50 employed at any one time	Unknown	About 50 employed at any one time	Unknown	Unknown
Contaminants at Levels of Public Health Concern:	Unknown	Unknown	Arsenic, pentachlorophenol, dioxins/furans, creosote	None	None
Exposure Duration:	Maximum of 47 years (operating time of site)	Maximum of 47 years (operating time of site)	Maximum of 47 years (operating time of site)		

Potential Health Effects:	cannot determine, see Toxicologic Evaluation section discussion	see Com Heal Conc Evalu section	rmine, munity th erns uation	various orga cancer or ot disorders, so Toxicologic Evaluation s discussion	her ee		
Source:	McCormick & Baxter, possil others upstre	bly	McCormick & Baxter, possibly others along river		McCormick & Baxter, possibly others upstream		McCormick & Baxter or others
Medium:	Sediment		Aquatio	e biota	Surface	water	Air
Exposure Point:	On and off sit	te	Off site		Off site		Off site
Exposure Route:	Skin contact		1 0 11		Skin contact, ingestion		Inhalation
Receptor Population:	Trespassers, children, form workers	ner	Area fishermen		Shoreline users, fishermen, water skiers, swimmers		Nearby residents, on-site and nearby workers
Exposure Period:	Past, present future for trespassers, children Past for form workers		Past, present, future		Past, pi future	esent,	Past, present, future
Number Exposed:	Workersabo 50 employed any one time		Unknov	wn	Unknown		Unknown
Contaminants at Levels of Public Health Concern:	Unknown		None		Unknov	wn	Unknown
Exposure Duration:	Temporary				Tempo	rary	Unknown
Potential Health Effects:	Unknown				Unknov likely	wn, none	Unknown

<u>Table 10</u> Summary--Potential Pathways and Associated Health-Related Information

PATHWAY NAME:	Soils (on site)	Air (on site)	Sediment (on site and off site)
Source:	McCormick & Baxter	McCormick & Baxter	McCormick & Baxter
Medium:	Soils	Air	Sediment
Exposure Point:	On site	On site	On site, off site
Exposure Route:	Ingestion, skin contact, inhalation	Inhalation	Skin contact
Receptor Population:	Remedial workers, future site users	Site users	Shoreline users
Exposure Period:	Present, future	Future	Future
Number Exposed:	Unknown	Unknown	Unknown
Contaminants at Levels of Public Health Concern:	Unknown	Unknown	Unknown
Exposure Duration:	Unknown	Unknown	Temporary
Potential Health Effects:	Cannot determine	Cannot determine	Cannot determine

APPENDIX C-PUBLIC COMMENTS

The McCormick and Baxter public health assessment was available for public review and comment in the local library and local neighborhood association office for a 60-day period ending April 10, 1995. The public comment period was announced in local newspapers. In addition, the public health assessment was sent to one individual. Several sets of comments were received. Specific comments and responses are summarized below. When duplicate comments on specific and particular issues were received, we responded only once.

1. Comment: Many comments seem to address, in part, elements of the methods that are inherent in our health assessment process (which was described in the Forward of the health assessment document). Thus, as a preliminary to answering specific questions, it seems appropriate to briefly summarize the assessment process.

Response:

ATSDR is required by law to conduct a public health assessment at each site that is proposed for the EPA's National Priority List (NPL). An initial release of the

document must be made within 1 year of the proposal date. The aim of the assessment evaluations is to:

- learn whether people are being exposed to hazardous substances, and,
- if so, decide whether that exposure is harmful and should be stopped, and,
- decide whether additional media or human exposure information are needed to adequately define important public health issues.

ATSDR scientists review available environmental data (generally supplied by government agencies, businesses, and the public) to identify concentrations of contaminants in pertinent environmental media. If the environmental data base is incomplete (which it usually is), the report will recommend sampling ATSDR believes is pertinent to clarifying substantive public health issues.

If review of data shows that people have or could come into contact with contaminants, ATSDR scientists then evaluate whether or not there may be harmful effects from those exposures. In those evaluations, our scientists generally make use of existing scientific (e.g., medical, toxicologic, epidemiologic, disease registry) information.

ATSDR scientists also need to learn what people in the area know about the site and what concerns they may have about its impact on their health. Throughout the evaluation process, we actively gather information and comments from people who live or work near a site. Initially, community health concerns are usually collected at public availability sessions, which ATSDR generally holds at the beginning of the site investigation. Community members have further opportunity to voice their concerns during the public comment period. The community's health concerns are then addressed in the public health assessment.

The report presents conclusions about the level of health threat, if any, posed by a site. Any indeterminate health issues, which usually result from an inadequate data base, are also described. For indeterminate issues that might have an associated substantive public health connotation, recommendations are made to obtain data that would aid in their future resolution.

2A. Comment: It is imperative that, because of recreational uses of the Willamette River and concentrations of pollutants due to multiple sources, the community should be able to assess the full level of pollution as well as the residual and ongoing effects of the McCormick & Baxter contaminants--thus, the assessment should be expanded to include river water quality data.

Response:

ATSDR reported in the assessment that there was no river water quality data for the site vicinity. We have no reason to expect that the low exposure doses associated with incidental ingestion during recreational activities would result in definable human health effects. Therefore, river sampling was not recommended, because we believe that the additional information would not substantively enhance our

assessment of the site and community effects.

The document has not been changed.

2B. Comment: People use the river to feed their families. No testing was done of fish other than the large scale sucker and crayfish. It is imperative that, because of recreational uses of the Willamette River and concentrations of pollutants due to multiple sources, the community should be able to assess the full level of pollution as well as the residual and ongoing effects of the McCormick & Baxter contaminants--thus, the assessment should be expanded to include more thorough testing of other species of fish which recreational fishermen might encounter.

Response:

ATSDR reported the crayfish and fish data and associated subsistence consumption health consequences. We have no reason to expect that exposure doses associated with eating fish other than those already sampled would result in additional definable health effects. Therefore, we did not recommend sampling for other species because we believe that the additional information would not substantively enhance our assessment of the site and community effects.

The document has not been changed.

3. Comment: The assessment states that not enough soil sample information is available to make a representative judgement of the true contamination levels in the off site area. The community and future users of the land surrounding the site should be apprised of the true contamination levels. Further soil sampling must take place.

Response:

The Public Health Implications Section says that results from several residential soil samples show that contaminant levels are so low that it is unlikely that anyone will get sick from incidentally ingesting soil. Similarly low concentrations were found on the adjacent industrial properties, and, it is for just that area that the document indicates uncertainty about whether the number of samples reasonably represent the true concentrations. Therefore, the first recommendation presented in the document has been expanded to include sampling on more than one adjacent industrial property.

4. Comment: How long will the riverbank be dangerous to the health of the public?

Response:

Many of the contaminants present in water front sediments will be potent for a long, undefinable time, and the assessment has been revised to reflect that feature for selected exposure pathways. The assessment reported that ODEQ has plans for remediation of those materials. ATSDR does not know the schedule.

5. Comment: On Page 1 and 22, the document says: "Site should not be developed until contamination levels have been reduced below levels of health concern". Are there standards for each contaminant and, if so, how do the standards compare with what is on site and compare with data in the report tables. Cleanup should be thorough and should go beyond the minimum standard to allow for the possibility of more stringent standards occurring in the future.

Response:

We determined that it was important to revise the statement in question because site remediation is expected to be achieved in multiple ways, including contaminant reduction. The statement now reads: "The site should not be developed or otherwise accessed by the public until remediation measures are accomplished in a manner that effectively prevents human exposures from occurring at levels of public health concern."

ATSDR does not determine remediation criteria; those are the purview of the agency (ODEQ) overseeing the activity and typically could vary from site to site.

The comparison values shown in our tables have an public health foundation but are not remediation criteria. As stated in the <u>Environmental Contamination and Other Hazards</u> section of the document, comparison values are used, along with other criteria, to help decide which contaminants warrant further examination in the <u>Public Health Implications</u> (PHI) section. It is in the PHI section that concentrations are coupled with specific exposure scenarios and community concern information to evaluate health issues.

6. Why wasn't a door-to-door survey conducted of people who live on the ridge above the site, as well as a search for and survey of former residents? Residents have had concerns about the plant and its odors for years.

Response:

ATSDR often conducts door-to-door surveys as part of a community health study, or investigation. For purposes of gathering community health concerns during the public health assessment process, ATSDR holds public availability sessions. We advertise these meetings through the media and rely on existing community groups to spread the word about the meetings.

7. Anecdotal evidence of considerable community health erosion, including a rash of cancers in the neighborhood, warrants further investigation.

Response:

There are (at least) three reasons why community members may request a health investigation. We assume the request may be motivated by one or more of the following questions:

- does exposure to a site-related contaminant cause adverse health effects in people,
- is there an association between exposure and disease in the site community, and

do certain members of the community need medical management of an adverse health effect?

Exposure to site-related contaminants and adverse health effects in people

A health study is designed to address the question, is there an association between the occurrence of a specific disease (or constellation of related diseases) and exposure to a specific chemical (or group of chemicals). At this site, a study would investigate the specific relationship between exposure to wood treating chemicals and adverse health effects in people.

Many studies have been conducted with people occupationally exposed to wood preserving chemicals, as described in the <u>Public Health Implications</u> sections above, and adverse health effects resulting from exposure are known. A health study of this community may not show any additional general information.

Association between exposure and disease in the site community

A health study of this community is not likely to show an association between exposure and disease. The design of a health study of this community would try to show an association between a particular disease (cancer in general would be inappropriate, for reasons discussed below) and exposure to wood preserving chemicals.

With no way to determine who was exposed to those chemicals in the community, the only question a study could answer would be, is there a higher rate of a specific disease in the community relative to some standard. Such a study would in no way address the association between exposure and disease. Moreover, such a study would by design substantially underestimate any effect on those truly exposed to chemicals, since the study would be diluted by all the people who lived in the community but who were not exposed.

Exposure to specific chemicals causes specific diseases. Cancer is not a specific disease. Different cancers have different causes and different courses. Some cancers may be caused by exposure to carcinogens; exposure to a carcinogen does not cause many different cancers in different people. An anecdotal report of a rash of cancers does not imply that many people were exposed to carcinogens, although a report of an increase in certain specific cancers could be an indication of exposure.

In addition, a health study of this type simply answers whether there is a statistical association between exposure and disease. Therefore, the study requires a minimum number of exposed participants in order to be statistically valid.

Medical management of an adverse health effect

As recommended in the <u>Public Health Implications</u> section, concerned individuals should discuss potential chemical exposures when consulting their physicians. As recommended in the <u>Recommendations</u> section, community health education efforts should help raise awareness in potentially exposed people to seek medical help when indicated and to mention potential exposures. Health professionals education should help raise health care practitioners' awareness of signs and symptoms of chemical exposure.

Recommendations

Based on what investigations can and cannot do at this site, we have recommended community and health professions education. If a population can be identified that has been exposed to wood treatment process chemicals from the site, ATSDR will evaluate whether a health investigation is appropriate.

8. Why wasn't a health study conducted on former McCormick and Baxter employees and their families?

Response:

As a rule, ATSDR refers health issues of former workers to an appropriate federal or state occupational health agency. As discussed above, we know that adverse health effects often result in workers exposed to high levels of wood-preserving chemicals.

9. The public health assessment recommends that individuals concerned about chronic bronchitis and lung tissue damage should discuss potential chemical exposure with their physicians; however, individuals may not know to mention McCormick and Baxter as a possible contributor to health concerns.

Response:

Individuals and health care providers should be made aware of potential exposures related to the McCormick and Baxter site, as well as the signs and symptoms of exposure to site-specific chemicals, as part of the community and health professionals health education effort recommended in the <u>Recommendations</u> section.

10. ATSDR would not have conducted the public health assessment if the health of the public was not in danger.

Response:

ATSDR is required by law to conduct a public health assessment at each site that is proposed for the EPA's National Priority List (NPL). Proposal of a site to the NPL indicates the potential for that site to pose a public health threat and the need for ATSDR to evaluate the site's public health implications, as described in the response to comment #1.

11. The public comment period was too short.

Response:

ATSDR usually provides a month-long public comment period. For special circumstances, we schedule a longer time period. The public comment period for this document was approximately two months long. Individuals who contacted the Agency within the public comment period and indicated that comments were forthcoming were assured their comments would be addressed.

12. Since the report indicates that there are few problems due lack of data, only minor cleanup will be conducted and the site will continue to pose a health hazard.

Response:

ATSDR disagrees.

We determined public health hazards posed by the site. We concluded that the site posed a public health hazard for former plant workers, poses a public health hazard

for people who might encounter hazardous chemicals along the shoreline, and poses an indeterminate public health hazard for nearby residents because of past, present and future inhalation exposure.

We asked for additional information. We recommended air monitoring, noting that the adverse lung symptoms reported by people who live near the site are consistent with exposure to site-related contaminants.

We recommended actions to protect the community's health. We recommended that the site not be developed or otherwise made accessable by the public until remediation measures are accomplished in a manner that effectively prevents human exposures from occurring at levels of public health concern.

As an advisory agency, we cannot require other agencies to follow our recommendations. However, other agencies often rely on our recommendations when taking actions to protect the public's health.

13. The commentor's personal experience with wood preserving chemicals indicates that exposure does not have to be intense and over many years to have serious detrimental effects.

Response:

ATSDR concurs, as stated in the <u>Public Health Implications</u> section.

14. Signs and warning in a variety of languages should be provided to the resource agencies that work with non-english speaking groups that fish the slough and rivers for food.

Response:

ATSDR will include non-english speaking groups that rely on fish and crayfish for food when conducting a needs assessment of the community.

15. The report concludes that lung symptoms are consistent with exposure to site-related contaminants, but did not collect information from residents about lung-related problems in an orderly fashion. Depending upon insufficient data will result in a report that does not safeguard health.

Response:

Without information about exposure, a link between exposure and adverse health effect cannot be established. We did say that the adverse lung symptoms are non-specific symptoms known to be experienced by people with no known exposure to hazardous waste, but they are also consistent with exposure to site-related contaminants.

We recommended that the site be prevented from being developed or otherwise accessed by the public until remediation measures are accomplished in a manner that effectively prevents human exposures from occurring at levels of public health concern. We also have recommended gathering additional data on soil and air.

16. The report indicates that, should additional information become available, conclusions will be revised, but is unclear how additional data will be made available. ATSDR needs to require additional study in order to have a meaningful response.

Response:

ATSDR has identified data gaps (including contaminant levels in soil on adjacent industrial property, air quality on site while air-release-related remediation activities are in progress, and ambient air quality where residents continue to express concern about odors) and has requested more information be gathered. As an advisory agency, we cannot require other agencies to follow our recommendations.

17. How will health professionals and members of the community receive recommended education?

Response:

ATSDR staff plan to determine appropriate site-specific health education activities for health professionals and community members through a needs assessment. The <u>Public Health Action Plan</u> section of the public health assessment has been revised to reflect this information.

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